AgriARM Applied Research Management

Demonstrating N Fertilizer Options to Maximize Spring Wheat Yield and Protein

In recent years, there has been an increase in wheat yields with a drop in protein levels as low as 10 % leading to a drop in value by more than $ 2/bu. Attempts to increase protein by applying more N fertilizer often leads to increased lodging, yield loss and/or difficulty during harvest. The dilemma that growers face is in knowing which option or combination of options would be most effective to adopt. The use of several controlled release nitrogen (CRN) fertilizers can delay conversion of N, resulting in more for protein formation. Another option is to grow lodging resistant varieties, which allow higher rates of untreated N fertilizer application at seeding. A third option is to grow varieties with higher inherent % protein. The objective of this study was to demonstrate the effects of CRN fertilizers on grain yield and % protein of three spring wheat varieties with differing grain yield and protein potentials.

Field trials were conducted at Scott and Melfort in the 2015 growing season. A 3 x 7 factorial experiment in a randomized complete block design with four replicates was set up. The first factor was wheat variety (Shaw VB, Goodeve VB and Lillian) and the second factor was the type of N (Urea, ENS/Urea and Super U/Urea @ 50:50 and 75:25 blends, Urea/UAN and Check). Treatment means were separated according to Tukey's HSD and considered significant at $P<0.05$.

DTM, TKW and bushel weight were all significantly affected by only wheat varieties. Grain yield was also affected by only wheat varieties; however, both wheat varieties and N type had significant effects on % protein. Yield and protein had inverse relationship (Fig 1). N type had effects on both yield and protein % for the blends relative to the check, however, within the different N types there wasn't significant differences (Fig 2). Despite the non-significant effects of the N types on grain yield, urea alone (100 %) had the highest yield relative to all the blends (Fig 2). The UAN blend had the highest % protein relative to the ESN and Super U blends, possibly because 20% of the N was applied as liquid UAN at the flag leaf stage rather than at seeding. There was a slightly higher protein % for the ESN treatments compared to the Super U treatments (Fig 2). This may be because in drought years Super U could provide a quicker source of N to the plant compared to ESN (McDonald, 2010). This leaves more N in the ESN blend for later use, leading to the relatively higher protein %.

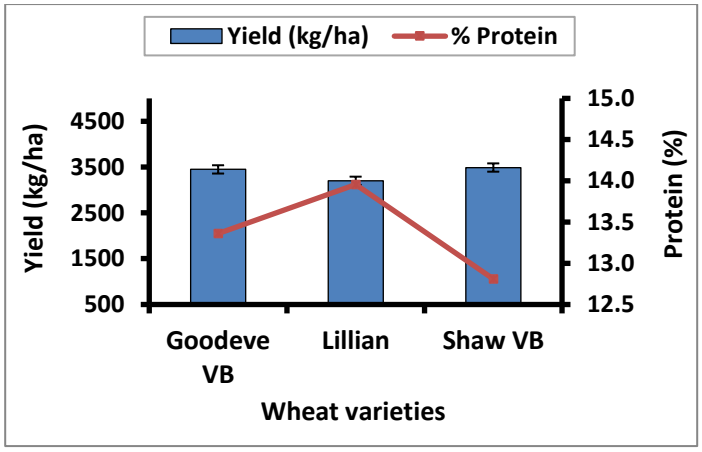

Figure 1. Effects of wheat variety on grain yield (*columns*) and grain protein % (*line*) during the 2015 growing season.

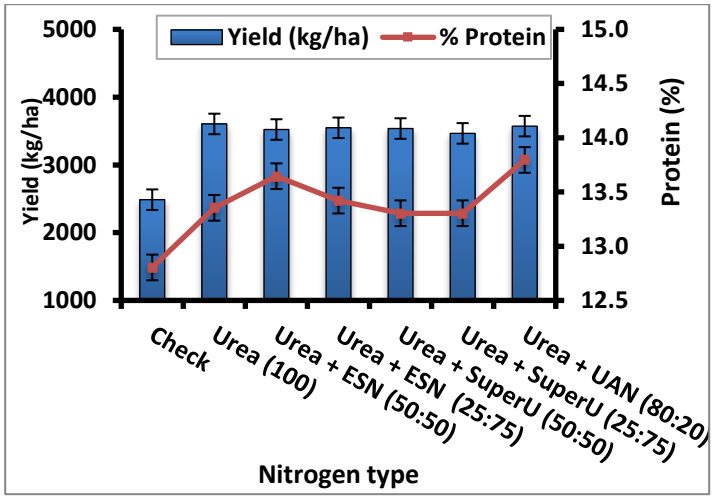

Figure 2. Effects of nitrogen type on grain yield (*columns*) and grain protein % (*line*) during the 2015 growing season

From the study, the most effective strategy for increasing protein in wheat is choosing varieties that are low-yielding but have high % protein. Hence, either Lillian or Goodeve VB should be considered for both Scott and Melfort. There is no advantage for the CRNs or for the products ENS and Super U when considering only yield. However, the CRNs could delay N availability until later in the season to increase % protein. Download full reports at: www.westernappliedresearch.com or http://neag.ca/

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